

BA: 0.3 part 2

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We take this property as an axiom.

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Remark: It may be convenient to start at a number different than 1.

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Example: $\{a, b\} \times \{c, d\} = \{(a, c), (a, d), (b, c), (b, d)\}$.

Example: $[0, 1] \times [0, 1]$ is the subset of the plane bounded by a square with vertices $(0, 0)$, $(0, 1)$, $(1, 0)$, and $(1, 1)$.

Notation: $A^2 := A \times A$. E.g., $\mathbb{R}^2 = \mathbb{R} \times \mathbb{R}$ is the plane.

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A is called the *domain* of f and B is called the *codomain* of f .

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The “number of classrooms” is a function that takes the set of buildings on campus to the integers.

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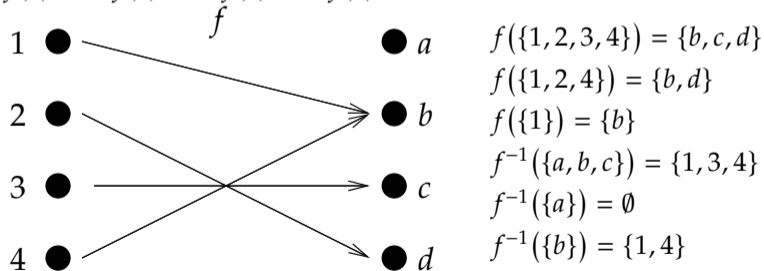
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Example: Define $f: \{1, 2, 3, 4\} \rightarrow \{a, b, c, d\}$ by

$$f(1) := b, f(2) := d, f(3) := c, f(4) := b$$



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Example: $f: \mathbb{R} \rightarrow [0, \infty)$ (the non-negative real numbers) given by $f(x) := x^2$ is not an injection (same reason as above), but it is a surjection.

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So a composition of bijections is a bijection.